

# **AIR FORCE QUALIFICATION TRAINING PACKAGE (AFQTP)**



for  
**PAVEMENTS & CONSTRUCTION EQUIPMENT OPERATOR**  
**(3E2X1)**

**MODULE 13**  
**POWERED EQUIPMENT**

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Career Field Education and Training Plan (CFETP) references from 1 Apr 97 version.

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**Notice.** This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

**AIR FORCE QUALIFICATION TRAINING PACKAGES**  
**for**  
**PAVEMENTS & CONSTRUCTION EQUIPMENT OPERATOR**  
**(3E2X1)**

**INTRODUCTION**

*Before starting this AFQTP*, refer to and read the “Trainee/Trainer Guide” located on the AFCEA Web site <http://www.afcesa.af.mil/>

*AFQTPs are mandatory and must be completed* to fulfill task knowledge requirements on core and diamond tasks for upgrade training. *It is important for the trainer and trainee to understand* that an AFQTP ***does not*** replace hands-on training, nor will completion of an AFQTP meet the requirement for core task certification. AFQTPs will be used in conjunction with applicable technical references and hands-on training.

*AFQTPs and Certification and Testing (CerTest) must be used as minimum upgrade requirements for Diamond tasks.*

**MANDATORY minimum upgrade requirements:**

***Core task:***

AFQTP completion  
Hands-on certification

***Diamond task:***

AFQTP completion  
CerTest completion (80% minimum to pass)

**Note:** *Trainees will receive hands-on certification training for Diamond Tasks when equipment becomes available either at home station or at a TDY location.*

***Put this package to use.*** Subject matter experts under the direction and guidance of HQ AFCEA/CEOF revised this AFQTP. If you have any recommendations for improving this document, please contact the Career Field Manager at the address below.

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## POWERED EQUIPMENT

**MODULE 13**

**AFQTP UNIT 1**

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### PERFORM OPERATIONAL CHECKS (13.1.)

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## PERFORM OPERATIONAL CHECKS

### *Task Training Guide*

<b>STS Reference Number/Title:</b>	13.1. Perform Operational Checks
<b>Training References:</b>	<ul style="list-style-type: none"> <li>• Owners Manuals</li> <li>• Local Procedures</li> </ul>
<b>Prerequisites:</b>	<ul style="list-style-type: none"> <li>• Possess as a minimum a 3E231 AFSC.</li> </ul>
<b>Equipment/Tools Required:</b>	<ul style="list-style-type: none"> <li>• Concrete Saw</li> <li>• Air Compressor</li> <li>• Pneumatic Hammer</li> <li>• Personal Safety Equipment</li> <li>• General Tool Kit</li> </ul>
<b>Learning Objective:</b>	<ul style="list-style-type: none"> <li>• The trainee will be able to properly check out powered equipment</li> </ul>
<b>Samples of Behavior:</b>	<ul style="list-style-type: none"> <li>• The trainee will check out a concrete saw, air compressor, and pneumatic hammer.</li> </ul>
<b>Notes:</b>	
<ul style="list-style-type: none"> <li>• Personnel are required to wear all personal protective equipment pertaining to each task (i.e. work gloves hearing protection, safety goggles, etc.)</li> </ul>	
<ul style="list-style-type: none"> <li>• Any safety violation is an automatic failure</li> </ul>	

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## PERFORM OPERATIONAL CHECKS

**Background:** There are many different types of air compressors, concrete saws, and pneumatic hammers used by the Air Force. Specific checkout procedures for each will be found in the owner's manual that accompanies the equipment. It is important that this equipment be properly checked and serviced prior to operation. This ensures the equipment will operate in the manner in which it was designed and that you will be able to get the job done as efficiently as possible. We will discuss the different types of powered equipment separately. Let's get started with the air compressor.

### AIR COMPRESSOR:

*To perform the tasks, follow these steps:*

**Step 1: Perform a 360-degree walk around inspection.**

Look for obvious leaks and damage.

**Step 2: Open or remove all side panels.**

**Step 3: Check engine oil level.**

Locate and pull the dipstick. The oil level should be between the add and full marks. If the oil is below the add mark, gradually add oil to bring the level to the full mark.

**Step 4: Check compressor oil level.**

Depending on the type of compressor, the oil check is accomplished in one of two ways. The two most common methods are a dipstick and sight glass. If in doubt, check the owner's manual to confirm which method to use.

**NOTE:**

When adding compressor oil, consult the owner's manual for the type/grade of oil to use.

**Step 5: Inspect coolant level.**

Ensure the coolant level is visible in the filler neck or overflow bottle of the radiator.

**SAFETY:**

**THE COOLING SYSTEM BECOMES PRESSURIZED WHEN IT IS HOT. THEREFORE, NEVER REMOVE THE RADIATOR CAP TO INSPECT THE COOLANT THIS COULD CAUSE SERIOUS INJURY.**

**Step 6: Perform engine compartment inspection.**

Visually inspect the compartment for obvious damage and leaks.

**HINT:**

Puddles of fluid and dirty areas on the engine or ground normally indicate a problem and should be investigated prior to operating.

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**Step 7: Check fuel level**

Visually look at the fuel gauge for proper level and make sure the right type of fuel (Gasoline or Diesel) is used.

**Step 8: Inspect the air compressor hoses and connections.**

Ensure hoses are in good repair and that they have no holes in them. Check the connections to make sure that all of the rubber grommets are in good repair and in place.

**Step 9: Safety Wire.**

Have safety wire on hand and use it on every hose connection.

**CONCRETE SAW:**

*To perform the task, follow these steps:*

**Step 1: Check engine oil level.**

Locate and pull the dipstick. The oil level should be between the add and full marks. If the oil is below the add mark, gradually add oil to bring the level to the full mark.

**Step 2: Check water system.**

The concrete saw uses water on the concrete blade to prevent heat buildup that causes the blade to warp or break. Attach a water hose to the saw and ensure the water system on the blade is operational.

**Step 3: Inspect blade.**

Make certain the blade is properly mounted and secured prior to operation.

**NOTE:**

The concrete blade will have markings to show the direction of rotation. Make sure the blade is properly installed.

**PNEUMATIC HAMMER:**

*To perform the task, follow these steps:*

**Step 1: Check hammer oil level.**

Locate and remove the oil plug on the side of the hammer. The oil level is correct when the oil is level with the bottom opening of the plug hole.

**Step 2: Check air hose connector.**

Check the connections to make sure that all of the rubber grommets are in place and in good repair.

**Step 3: Inspect the bit safety latch.**

Insert a bit into the hammer, lock down the latch and confirm that the bit is secured into the hammer.

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**Step 4: Safety wire hammer and hose.**

Make certain to use safety wire to keep the hose and jackhammer connections from coming apart. Severe injuries could occur if the air hose is allowed to separate from the hammer.



**Review Questions  
for  
Perform Operational Checks**

<b>Question</b>	<b>Answer</b>
1. What are the two most common ways to check the compressor oil?	a. Sight glass, pressure check b. Dipstick, pressure check c. Sight glass, dipstick d. Oil plug, sight glass
2. What is the main purpose of the water system on the concrete saw?	a. Control dust b. To cool the engine c. To prevent heat buildup of the blade d. To aid in optimum moisture content
3. How do you check the oil in the pneumatic hammer?	a. There is no oil in the pneumatic hammer b. Sight glass c. Dipstick d. Oil plug

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**PERFORM OPERATIONAL CHECKS**

<b>Performance Checklist</b>		
<b>Step</b>	<b>Yes</b>	<b>No</b>
<b>AIR COMPRESSOR</b>		
1. Performed walk around inspection?		
2. Checked engine oil?		
3. Checked compressor oil level?		
4. Inspected coolant level?		
5. Performed engine compartment inspection?		
6. Inspected fuel level		
7. Inspected air compressor hoses and connections?		
<b>CONCRETE SAW</b>		
1. Checked engine oil?		
2. Checked water system?		
3. Inspected saw blade?		
<b>PNEUMATIC HAMMER</b>		
1. Checked hammer oil level?		
2. Checked air hose connector?		
3. Inspected safety latch?		
4. Use safety wire to secure hose to the hammer?		

**FEEDBACK:** Trainer should provide positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

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## USE POWERED EQUIPMENT/SAW BLADES

**MODULE 13**

**AFQTP UNIT 2**

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**CONCRETE SAW (13.2.4.)**

**ASPHALT (13.2.10.1.)**

**WET/DRY (13.2.10.2.)**

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**CONCRETE SAW  
ASPHALT  
WET/DRY**

***Task Training Guide***

<b>STS Reference Number/Title:</b>	13.2.4. Concrete Saw 13.2.10.1. Asphalt 13.2.10.2. Wet/Dry
<b>Training References:</b>	<ul style="list-style-type: none"> <li>• Local Technical Order</li> <li>• Local Procedures</li> </ul>
<b>Prerequisites:</b>	<ul style="list-style-type: none"> <li>• Possess as a minimum a 3E231 AFSC</li> </ul>
<b>Equipment/Tools Required:</b>	<ul style="list-style-type: none"> <li>• Concrete Saw</li> <li>• Asphalt Blade</li> <li>• Wet/Dry Blade</li> <li>• Personal Safety Equipment</li> <li>• General Tool Kit</li> </ul>
<b>Learning Objective:</b>	<ul style="list-style-type: none"> <li>• The trainee will be able to cut asphalt and concrete with the saw</li> </ul>
<b>Samples of Behavior:</b>	<ul style="list-style-type: none"> <li>• The trainee will make a utility cut using a concrete blade and an asphalt blade</li> </ul>
<b>Notes:</b>	
<ul style="list-style-type: none"> <li>• Personnel are required to wear all personal protective equipment pertaining to each task (i.e. work gloves, hearing protection, safety goggles, etc.)</li> </ul>	
<ul style="list-style-type: none"> <li>• Any safety violation is an automatic failure.</li> </ul>	

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**CONCRETE SAW  
ASPHALT  
WET/DRY**

**Background:** A concrete saw cuts rigid or flexible pavement to ensure clean, straight, vertical edges which provide for a better patch. Sawing rigid pavement involves the use of a concrete saw equipped with a diamond-tipped blade. This blade is very expensive and if properly cared for, will last a long time. The diamond-tipped blade is sometimes referred to as a Wet/Dry blade because, while cutting concrete, the blade must have water on it or heat buildup will cause the blade to warp or break. When cutting asphalt, water is not required, but is still recommended. The asphalt blade or abrasive blade is utilized for cutting asphalt. This type of blade is made of a special material that does not require water. However, a disadvantage of using this blade is it wears down very quickly and will need frequent changing. It is important for you to know how to utilize both types of blades so that you will be prepared for any situation.

*To perform the tasks, follow these steps:*

**Step 1: Mark area to be cut.**

Patch area should be laid out as a rectangle and corners should be square. Marking material must be waterproof. Mark the lines for concrete repair at least two inches and asphalt repair at least one foot back from the defective area making sure you remove all of the defective material.

**Step 2: Perform pre-operational inspection.**

Refer to AFQTP 13.1. for proper pre-operational inspection instructions. Install either a wet/dry blade or asphalt blade, depending on the type of pavement you are cutting.

**Step 3: Start the saw.**

Verify that the drive clutch is disengaged before attempting to start the engine. Be aware that once the engine starts, the saw blade will start turning.

**SAFETY:**

**NEVER STAND IN FRONT OF THE SAW WHEN THE ENGINE IS RUNNING.** Hearing protection, goggles, and safety shoes are required when using the saw.

**Step 4: Align saw blade on marked lines for cut.**

Align the saw blade on the marked line. Turn on the water (if necessary) before lowering the blade into the pavement.

**Step 5: Cut.**

Slowly lower the blade to the desired depth and engage the drive clutch. Make a vertical cut with the saw a minimum of 2" deep. (Cuts of less than 2" could allow the blade to jump out of the cut possibly damaging the blade). Guide the saw along the marked line by making small adjustments from side to side. Don't try to move the saw excessively sideways while it is cutting or you could damage the blade. When you reach the end of the cut, disengage the drive clutch, raise the blade, and if applicable, turn off the water.

**NOTE:** Overlap the cut by 1/2 the blade width when making corner cuts. This ensures the patch will have square corners

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**Review Questions  
for  
Concrete Saw  
Asphalt  
Wet/Dry**

<b>Question</b>	<b>Answer</b>
1. What actions should be taken before starting the concrete saw?	a. Clear personnel from standing in front of the blade b. Properly check out the saw c. Disengage the drive clutch d. All of the above
2. What is the minimum depth you should cut when using the concrete saw?	a. 1 inch b. 2 inches c. 3 inches d. 4 inches
3. When should you use the water system on the concrete saw?	a. When cutting asphalt b. When using the abrasive blade c. When the engine starts to overheat d. When using the diamond-tipped blade
4. Why should saw cuts overlap at least one-half the blade diameter?	a. To allow for concrete expansion and contraction b. Permit the blade to cool down before finishing c. Ensure the patch will have square corners d. Allow the water from the saw to drain

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**CONCRETE SAW  
ASPHALT  
WET/DRY**

Performance Checklist		
Step	Yes	No
1. Marked area to be cut?		
2. Performed pre-operational inspection?		
3. Used all required safety equipment?		
4. Started the saw?		
5. Utilized water on diamond-tip blade?		
6. Aligned saw blade with proposed cut?		
7. Cut pavement?		

**FEEDBACK:** Trainer should provide positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

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## USE POWERED EQUIPMENT/SAW BLADES

**MODULE 13**

**AFQTP UNIT 2**

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**AIR COMPRESSOR (13.2.6.)**

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**AIR COMPRESSOR*****Task Training Guide***

<b>STS Reference Number/Title:</b>	13.2.6. Air Compressor
<b>Training References:</b>	<ul style="list-style-type: none"> <li>• Local Technical Order</li> <li>• Local Procedures</li> </ul>
<b>Prerequisites:</b>	<ul style="list-style-type: none"> <li>• Possess as a minimum a 3E231 AFSC.</li> </ul>
<b>Equipment/Tools Required:</b>	<ul style="list-style-type: none"> <li>• Air compressor</li> <li>• Personal safety equipment</li> <li>• General tool kit</li> </ul>
<b>Learning Objective:</b>	<ul style="list-style-type: none"> <li>• The trainee will be able to use an air compressor.</li> </ul>
<b>Samples of Behavior:</b>	<ul style="list-style-type: none"> <li>• The trainee will operate an air compressor.</li> </ul>
<b>Notes:</b>	
<ul style="list-style-type: none"> <li>• Personnel are required to wear all personal protective equipment pertaining to each task (i.e. work gloves, hearing protection, safety goggles, etc.)</li> </ul>	
<ul style="list-style-type: none"> <li>• Any safety violation is an automatic failure.</li> </ul>	

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## AIR COMPRESSOR

**Background:** Air compressors are often used for pneumatic hammer operation, but are also used to operate the crack-sealing machine, sand blasters, preparing or blowing out cracks for crack-sealing operations and other CE related equipment.

*To perform the tasks, follow these steps:*

**Step 1: Perform pre-operational inspection.**

Required daily before operating the compressor.

Refer to AFQTP 13.1 for proper pre-operational inspection instructions.

**Step 2: Ensure valves are closed before starting.**

All air valves must be closed prior to starting the compressor. If the valves are left opened, an unsecured hose could flop around causing serious injury to surrounding personnel.

**Step 3: Start the compressor.**

Most air compressors are equipped with a safety switch that will shut the compressor down in case of low oil pressure or an overheated radiator. The override switch on the compressor must be pressed in while cranking the compressor. Once the compressor starts and the oil pressure has built up past the shutdown phase, release the override switch for normal operation.

**Step 4: Safety precautions.**

Ensure everyone in the area is wearing hearing protection. Use safety wire to secure the attachment to the hose before operating the attachment. When operating the air compressor, a second person should be standing by ready to shut the compressor down in an emergency situation. This individual should be watching the gauges, hoses, and anything else that may appear to be out of the ordinary.

**Step 5: Bleed air pressure from hoses.**

After the engine stops, open an air valve to purge the air tank.

**NOTE: If a hose comes loose, DO NOT attempt to catch it, simply shut down the air compressor.**

**Review Questions  
for  
Air Compressor**

<b>Question</b>	<b>Answer</b>
1. When are Pre-operational checks required?	a. Weekly b. At the end of the day c. While refueling d. Before each start e. Daily prior to the first start
2. What is the purpose of the safety switch on the air compressor?	a. Shuts down the engine in case of low oil pressure or over heated radiator b. Shuts down the engine when it's low on fuel c. Shuts down the engine if a valve is left open d. Automatically turns the light on after dark
3. Why should the air valves be closed prior to starting the air compressor?	a. To build up brake pressure b. To build engine compression c. To override the safety switch d. Prevent loose hoses from injuring anyone

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**AIR COMPRESSOR**

<b>Performance Checklist</b>		
<b>Step</b>	<b>Yes</b>	<b>No</b>
1. Pre-operational inspection?		
2. Closed valves?		
3. Taken appropriate safety precautions?		
4. Started compressor?		
5. Shutdown and bleed air pressure?		

**FEEDBACK:** Trainer should provide positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

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## USE AIR COMPRESSOR ACCESSORIES

**MODULE 13**

**AFQTP UNIT 3**

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### **PNEUMATIC HAMMER WITH ATTACHMENTS (13.3.2.)**

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## PNEUMATIC HAMMER WITH ATTACHMENTS

### *Task Training Guide*

<b>STS Reference Number/Title:</b>	13.3.2. Pneumatic Hammer With Attachments
<b>Training References:</b>	<ul style="list-style-type: none"> <li>• Local Technical Orders</li> <li>• Local Procedures</li> </ul>
<b>Prerequisites:</b>	<ul style="list-style-type: none"> <li>• Possess as a minimum a 3E231 AFSC</li> </ul>
<b>Equipment/Tools Required:</b>	<ul style="list-style-type: none"> <li>• Pneumatic Hammer</li> <li>• Air Compressor</li> <li>• Personal Safety Equipment</li> <li>• General Tool Kit</li> </ul>
<b>Learning Objective:</b>	<ul style="list-style-type: none"> <li>• The trainee will be able to break concrete with a pneumatic hammer.</li> </ul>
<b>Samples of Behavior:</b>	<ul style="list-style-type: none"> <li>• The trainee will jackhammer a concrete patch.</li> </ul>
<b>Notes:</b>	
<ul style="list-style-type: none"> <li>• Personnel are required to wear all personal protective equipment pertaining to each task (i.e. work gloves, steel toe boots, hearing protection, safety goggles, etc.)</li> </ul>	
<ul style="list-style-type: none"> <li>• Any safety violation is an automatic failure.</li> </ul>	

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## PNEUMATIC HAMMER WITH ATTACHMENTS

**Background:** Using a pneumatic hammer or “jackhammer” is the most common way to break up defective concrete. The 50- to 90-pound jackhammer is most commonly used for breaking concrete slabs and operates on 90 psi of air pressure. The size of the hammer is determined by the thickness of the concrete. Thick concrete requires a heavy hammer where as thinner concrete allows you to use a smaller jackhammer. Whenever you operate any size hammer, you should always wear steel toe boots or toe guards, hearing protection, and eye protection. As you jackhammer the concrete, stand inside the area of defective pavement. If you stand outside the defective area while breaking out the pavement the bit tends to vibrate against the vertical faces damaging the adjacent area.

***To perform the tasks, follow these steps:***

**Step 1: Perform pre-operational inspection.**

Refer to AFQTP 13.1 for pre-operational checks.

**Step2: Insert bit into hammer.**

Ensure that the hammerlock is operational. Insert the proper bit into the hammerlock. Check to make sure it is secure.

**Step 3: Attach hammer to air hose.**

Attach the hammer to the air hose and secure it with safety wire.

**Step 4: Start the air compressor.**

Start the air compressor and open the air valve(s).

**Step 5: Hammer the pavement.**

Position the hammer as close to the defect as possible. Depress the trigger located on the handle of the hammer. The hammer will begin to drive into the concrete and the surface will begin to crack. Break the concrete into small pieces to make it easier to handle. Stop occasionally to remove pieces and continue in this manner until the entire defective area is removed.

**Step 6: Detach the hammer.**

Once the entire area is removed and you're completed with your task, shut down the air compressor, bleed the airlines, then detach the hammer from the air hose and place your tools in the proper locations.

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**Review Questions  
for  
Pneumatic Hammer with Attachments**

Question	Answer
1. What amount of air pressure does a 50-90 pound pneumatic hammer require to operate?	a. 110 psi. b. 100 psi. c. 95 psi. d. 90 psi.
2. Other than work gloves, what safety equipment is required when operating a pneumatic hammer?	a. Hearing protection b. Steel toe boots c. Eye protection d. All of the above

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### PNEUMATIC HAMMER WITH ATTACHMENTS

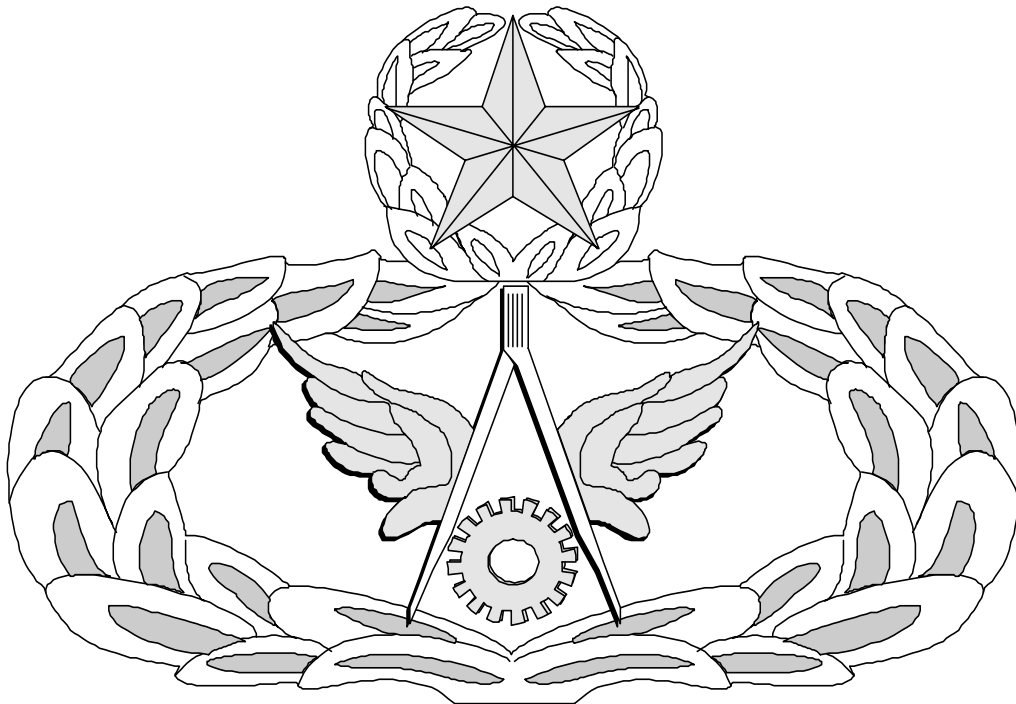
Performance Checklist		
Step	Yes	No
1. Pre-operational check?		
2. Attached hammer to air hose?		
3. Inserted bit?		
4. Hammered pavement?		

**FEEDBACK:** Trainer should provide positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

# **Air Force Civil Engineer**

## **QUALIFICATION TRAINING PACKAGE (QTP)**

### **REVIEW ANSWER KEY**



**For**  
**PAVEMENTS & CONSTRUCTION EQUIPMENT OPERATOR**

**(3E2X1)**

### **MODULE 13**

### **POWERED EQUIPMENT**

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**Key-1**

**PERFORM OPERATIONAL CHECKS  
(3E2X1-13.1.)**

<b>Question</b>	<b>Answer</b>
1. What are the two most common ways to check the compressor oil?	c. Sight glass, dipstick.
2. What is the purpose of the water system on the concrete saw?	c. To prevent heat buildup of the blade.
3. How do you check the oil in the pneumatic hammer?	d. Oil plug.

**CONCRETE SAW  
ASPHALT  
WET/DRY  
(3E2X1-13.2.4.; 13.2.10.1.;13.2.10.2.)**

<b>Question</b>	<b>Answer</b>
1. Before starting the concrete saw, what should you ensure?	d. All of the above
2. What is the minimum depth you should cut when using the concrete saw?	b. 2 inches.
3. When should you use the water system on the concrete saw?	d. When using the diamond-tipped blade.
4. Why should saw cuts overlap at least ½ the blade diameter?	c. Ensure the patch will have square corners.

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**AIR COMPRESSOR  
(3E2X1-13.2.6.)**

<b>Question</b>	<b>Answer</b>
1. When are Pre-operational checks required?	d. Daily prior to the first start
2. What is the purpose of the safety switch on the air compressor?	a. Shuts down the engine in case of low oil pressure or overheated radiator.
3. Why should the air valves be closed prior to starting the air compressor?	d. Prevent loose hoses from injuring anyone.

**PNEUMATIC HAMMER WITH ATTACHMENTS  
(3E2X1-13.3.2.)**

<b>Question</b>	<b>Answer</b>
1. What amount of air pressure does a 50-90 pound pneumatic hammer require to operate?	a. 90 psi.
2. Other than work gloves, what safety equipment is required?	d. All of the above.

**Notice.** This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.